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ABSTRACT

A study examined the expectation that videotaped male models would be rated similarly to ratings previously found in research literature for red, blue, and monotone hues, and high, medium, and low levels of color saturation. Using a Graeco-Latin Square design, the ratings of 147 subjects (communications students at the University of Utah) were analyzed using the Activity, Potency, and Evaluation dimensions of nine semantic differential scales with both MANOVA and multiple regression. Results indicated that only for Activity did hues influence subjects' ratings of models and that models themselves had the most influence on the ratings. The major factor appeared to be the subjects' perceptions of, and expectations associated with, the term "model." Subjects may have rated models on the basis of how the models compared to subjects' expectations of how models should appear. The results suggest that people cannot be considered a phenomenon similar to inanimate objects when examining the influence of color. (A sample evaluation sheet, and tables of data are appended.) (SRT)

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A Preliminary Investigation: The Effects of Hue and Saturation on Ratings of Models*

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Abstract*

The study examined the expectation that male models would be rated similarly to ratings previously found in research literature for red, blue, and monotone hues, and high, medium, and low levels of saturation. Using a Graeco-Latin Square design, the ratings of 147 subjects, using the Activity, Potency, and Evaluation dimensions of nine semantic differential scales, were analyzed with both MANOVA and multiple regression.

The results indicate that only for Activity did hues influence the ratings of models. For all three dimensions, the models themselves appear to have the greatest influence on the ratings. For Activity, it appears that an intraction between hue and model best explains the results.

The study concludes that people cannot be treated as the same phenomenon as inanimate objects, when examining the influence of color. Subjects appear to have rated the models on the basis of expectations as to how the models should have appeared. Subjects most likely rated role performances, rather than the modles themselves.

*The paper presentation will include showing the videotapes of the models which were used as stimuli in this study.

A Preliminary Investigation: The Effects of Hue and Saturation on Ratings of Models

Color has three identifiable physical properties: wave length, luminance, and colorimetric purity. Three respective psychological attributes correspond to these properties: hue, lightness, and saturation (Alexander & Shansky, 1976).

Hue, most often perceived of as color, contains the colors of the spectrum; blue, red, yellow, and green are all hues. Brightness is the relation of color to black or white; brightness is lighter or darker. Saturation is the strength of a color; colors can be brilliant or dull (Sargent, 1964; Zettl, 1973).

Zettl (1973) identifies three interrelated functions of color for media use: informational, compositional, and expressive. The informational function refers to the use of color to clarify or distinguish objects. The compositional function helps to define the general form of an image to produce an overall aesthetic quality.

The expressive function assumes certain colors have distinguishable and predictable effects on human perception and consequent emotional behaviors. Claims about the emotional effects of color by aestheticians such as

Birren (1963) center on hue. For example, reds and yellows are perceived as warm and active, whereas blues and greens are cold and passive. Physiological research (e.g., Nourse & Welch, 1971) tends to substantiate these claims. Colors on the red end of the spectrum elicit higher emotional arousal than do colors on the blue end.

However, as Nourse and Welch indicate, a causal link between hue and arousal is likely to be misleading. They note that the relationship between saturation and wave length is described by a U-shaped function, suggesting the saturation of a color, rather than its hue, may be related to arousal.

Other research substantiates the importance of saturation on the emotional effects of color. Alexander and Shansky (1976) found that lightness and saturation are the major determinants in the perceived weight of color; hue is a relatively minor factor. Wright and Rainwater (1962) found that saturation has a strong linear effect on meanings assigned to colors, such that it manifests itself most powerfully in the relationship between connotations and perceptions.

According to Zettl (1973) the expressive function of color assumes people associate hues with certain emotional objects or events. Because reactions to hues are learned,

people come to associate certain meanings with hues (Black, 1965; Kohn, 1967). The intensity of the emotional responses to hues is influenced by the saturation of the hues. The intensity of the emotional responses is reflected in the strength of the meanings (Osgood, Suci, & Tannenbaum, 1957).

Research studies on the meanings of hues use various measurement scales to determine both the meanings and the strength of the meanings. Jacobs and Suess (1975) used the state scale of the State-Trait Anxiety Inventory. A number of studies have used the semantic differential with high success (e.g., Osgood, et al., 1957; Winn & Everett, 1979; Wright & Gardner, 1960; Wright & Rainwater, 1962).

Studies using the semantic differential have isolated three useful dimensions of meaning associated with hue and saturation: Activity, Potency, and Evaluation. A perusal of these studies indicates that red and blue hues consistently elicity specific meanings, which are summarized in Table 1.

Insert Table 1 about here

The expressive function of color suggests color can be used to create an emotional context by establishing moods for an object or event (Zettl, 1973). Research

studies which introduce color with some sort of visual material have found that those moods can be determined with the three dimensions of the semantic differential which are associated with hues. In general, findings from these studies indicate the content used with a color context does not alter the perceptions of the colors measured by semantic differential scales along the Activity and Potency dimensions; rather, the colors appear to consistently affect judgments of the content for these two dimensions of meaning.

Wright and Gardner (1960), for example, found that when colors associated with "strong" and "exciting" meanings are introduced with black and white (B/W) material, the meanings associated with the B/W material move in the direction of the meanings associated with the introduced colors. Osgood, et al. (1957) found that regardless of the object being judged, colors toward the red end of the spectrum increase the "activity" perceived in the object, and colors toward the blue end increase the "passivity" perceived.

For the Evaluation dimension, an interaction occurs between the object and the introduced color. Wright and Gardner attribute the interaction effect to the principle of congruity:

> The conceptual organization embodied by the picture modifies the threatening color stimulus so that it becomes safe, while the stimulus value of the color increases the liveliness of the conceptual organization represented by the picture, so that it becomes more pleasurable. (p. 303)

Wright and Gardner found that when colors associated with "good" and "safe" meanings are introudced with B/W material, the meanings associated with the B/W material move in the opposite direction of the meanings associated with the introduced colors. The Osgood, et al. study showed the same results. They suggest, for researchers interested in the Evaluation dimension, choosing culturally-accepted colors to go with particular products. Zettl (1973) suggests viewers <u>expect</u> the colors used as context to express the essential quality of an object or event.

Osgood, et al. found that two years after their initial inquiry they were able to use the congruity principle to predict direction of change in meaning:

> Given the judgment for a black and white version of a particular <u>product</u> and the judgment of a particular <u>color</u> appearing as a simple color-spot, it was possible to predict the direction of the change in judgment of that product when it appeared in a particular color. . . 77 percent of all changes were in the predicted direction, which, with the large N available here, was highly significant. (p. 301)

As expected, Osgood, et al. also found that the more

saturated the color, the more potent becomes the object being judged. In sum, for the Activity and Potency dimensions of judgment the effects of color are additive; for Evaluation, the effects are interactive with content.

The results of these studies suggest the usefulness of color's expressive function for various media productions, particularly for advertising. Colors could be used to elicit certain emotional responses to products, and decisions could be made about what colors to use with certain products if judgments of the products themselves were known.

Advertisers have used knowledge of color meanings for their material products for a number of years (Zettl, 1973). However, research has not been conducted on the influence of color on judgments of people. Certainly color choices are made in such areas as news sets (Winckler, 1983) and political brochures and commercials. Politicians, for example, want to be associated with certain characteristics (e.g., dynamic). Newscasters are often evaluated for their credibility and perceived favorableness for the viewer. Judgments of people, then, become very important to a number of constituents.

Quite possibly, many of the color strategies employed rely on <u>preferences</u> for colors, rather than on desired

emotional responses. Empirical demonstrations of such tactics are either lacking or are limited (e.g., by inferring the effectiveness of color from increased or decreased ratings in public polls).

An initial inquiry into the use of people with color has several problems. First, the issue is whether people can be, or are, perceived as objects. The literature cited here pertains to the influence of color on inanimate objects. In initial inquiries, the objects were essentially devoid of meaning; color was used to create meaning for the objects. Whether people can be abstracted to this level has important implications for current media practices, as well as for studies on the influence of color. Findings from such studies may prove useful to those interested in the media's use of people (e.g., women) as objects and stereotypes.

Second, an initial inquiry could use people with whom associated meanings are known (e.g., celebrities), but such meanings would be highly idiosyncratic and difficult to ascertain. For purposes of generalization, the influence of color should be applicable to strangers as well as known people. (Indeed, the purpose of using color strategies is to create meanings for people who

are relatively unknown.) Ultimately, given the findings of previous studies on the influence of color, it could be expected that for the Activity, Potency, and Evaluation dimensions of the semantic differential, the meanings associated with a person should not differ significantly from the meanings associated with the color context in which the person is presented.

Method

One hundred forty seven college students were selected from various undergraduate communication courses at the University of Utah. Subjects were broken into three groups: Group 1 had 51 subjects, Group 2 had 27 subjects, and Group 3 had 69 subjects. The overall subject population consisted of 76 males and 71 females. Subjects ranged in age from 17 to 41, with a mean age of 23.14 years.

The experiment was presented as a new technique for developing initial evaluations of models. To legitimize the study, each group was told that a "live portrait" was being developed as an alternative to the traditional method of submitting photographs by people applying for modeling jobs. Subjects were told this experiment was designed to evaluate the usefulness of this new method.

Stimuli consisted of videotapes of three male models

against backgrounds of different hues and varying degrees of saturation. Red, blue, and monotone (B/W) hues were used, as were high, medium, and low levels of saturation.

Each model was shown in a bust shot for thirty seconds, using a different hue/saturation combination. Models used were fair-skinned and wore neutral (black/white/gray) clothing, to limit the possibility of interactions between clothing color and the background color.

Before introducing the stimulus, subjects were given three identical sets of nine semantic differential scales with which to evaluate the models. Three of the nine scales were used to measure the dimension of Activity; three were used to measure Potency; and three were used to measure Evaluation. Table 2 displays the scales and the respective dimensions.

Insert Table 2 about here

Each scale ranged in value from one to seven. Because the individual scales were pooled, each of the three semantic dimensions were evaluated on 21-point scales (with three 7-point scales per dimension). The adjective pairs, and their order of presentation, were randomly ordered. The scales and instructions as they were given to subjects can be found in Appendix I.

A factor analysis was conducted for the nine scales and their influence on Activity, Potency, and Evaluation. The results, summarized in Table 3, suggest a definite underlying structure for each of the three dimensions. That is, the scales used to represent each of the dimensions intercorrelate strongly enough to conclude that each dimension is indeed being measured by the scales of which it is comprised.

Thus, for the Activity dimension, the Exciting, Active, and Loud scales load most strongly for that dimension. The results are similar for Potency and Evaluation. These results, which are consistent with the literature, suggest that these adjective pairs can be used confidently to measure Activity, Potency, and Evaluation in color studies.

Insert Table 3 about here

Because of the nature of the study, subjects were also tested for color blindness. The test results of those who rated as color deficient (10 subjects) were not included in the statistical analysis.

Design

The 3 X 3 X 3 design (Hue X Saturation X Model) required for this study would have required the use of 27 groups. Because of a limited availability of subjects, a Graeco-Latin Square design was employed so as to use

only the three groups. Each group saw three different hue/saturation/model combinations.

The design used thus had a repeated measures approach. It seemed likely that because each group saw three very different background colors, the subjects might become suspicious of the true nature of the study. Because the Graeco-Latin design allows the control of two nuisance variables, Groups were treated as a nuisance variable in this study (along with Models) so as to limit the possible influence of the repeated measures approach. (Post-experimental interviews indicate the subjects were not aware of the change in background colors.)

Table 4 shows the actual experimental design used.

Insert Table 4 about here

This design assumes no interactions among the rows, columns, and treatment levels of the square (Kirk, 1982). Thus, only main effects could be tested for. Interaction between model and color (Hue/Saturation) context for the Evaluation dimension, as suggested in the literature, could thus not be investigated in this study.

The specific null hypotheses tested in this study were:

1. Hue will not significantly contribute to the ratings of models for the Activity, Potency, or Evaluation dimensions of the semantic differentials. Specifically, no significant differences will be

found between ratings of models in the red, blue, or monotone conditions, for the Activity, Potency, or Evaluation dimensions.

2. Saturation will not significantly contribute to the ratings of models for the Activity, Potency, or Evaluation dimensions of the semantic differentials. Specifically, no significant differences will be found between ratings of models in the red, blue, or monotone conditions, for the Activity, Potency, or Evaluation dimensions.

Results

Data were analyzed with the MANOVA program for Graeco-Latin Square, in the SPSS Update 7-9 (Hull & Nie, 1981). For each of the three semantic dimensions (Activity, Potency, and Evaluation), a MANOVA was conducted to determine the effects of Hue, Saturation, Model, and Group on the ratings of the models. Tables 5, 6, and 7 summarize the results for the three dimensions.

For Activity (Table 5), main effects were found for both Hue and Model. The F value for Hue was 6.99 ($p < .05$), with two df. For Model, the F value was 4.34 ($p < .05$), with two df.

For Potency (Table 6), main effects were found only for Model. The F value for Model was 14.94 ($p < .05$), with two df. For Evaluation (Table 7), main effects were again found only for Model. The F value for Model

was 5.90 ($p < .05$), with two df.

Insert Tables 5, 6, and 7 about here

For Activity, the main effect for Hue is consistent with the literature. The null hypothesis for Activity, with regard to Hue, was therefore rejected. For Potency and Evaluation, the null hypotheses were sustained, with regard to Hue. For all three dimensions, the null hypotheses, with regard to Saturation, were sustained.

The main effect for Model, for any of the dimensions, was not expected. According to the literature, content should have no influence on the ratings. With the use of live models, content appears to influence ratings. This influence prompted further investigation. For each of the three semantic dimensions a stepwise multiple regression was conducted to determine the degree to which Hue, Saturation, Model, and Group contributed to the variance. The procedure used was New Regression, in the SPSS Update 7-9 (Hull & Nie, 1981). Significance was tested at $p \leq .05$.

Tables 8, 9, and 10 summarize the results of the regressions. For Activity, only Hue and Model entered into the regression equation. Model accounted for approximately 12% of the variance ($F=10.20$, $B=.207$, $p < .05$), and Hue accounted for approximately 8% of the

variance (F=13.12, B=.329, $p < .05$). Table 8 displays these results.

For Potency (Table 9), only Model entered into the regression equation. Model accounted for approximately 6% of the variance (F=8.79, B=.239, $p < .05$). For Evaluation (Table 10), only Group entered into the regression equation. Group accounted for approximately 3% of the variance (F=3.98, B=-.163, $p < .05$).

Insert Tables 8, 9, and 10 about here

For Activity, the regression results are consistent with the results found in the MANOVA. Given that Model accounted for a slightly higher percentage of the variance than did Hue, the results strongly suggest that with the use of a live model, content will override the influence of color context. The same can be said for Potency.

For evaluation, however, the presence of Group is surprising. Futher, it appears that the absence of Group is exerting an influence. The fact that Model did not enter into the regression equation, as would be expected from the MANOVA, prompted further investigation.

Tables 11, 12, and 13 summarize the results of regressions conducted to determine the influence of specific Hues, Models, and Groups on the ratings. For Activity (Table 11), only blue entered into the regression

equation. Blue accounted for approximately 8% of the variance ($F=11.77$, $B=-.274$, $p<.05$). In the regression for Model, to determine the influence of Models 1, 2, and 3, no one or combination of the models significantly contributed to the variance (i.e., none of the models entered into the regression equation).

Given the beta weight, which is negative, the absence of blue appears to partially account for the ratings of the models on the Activity dimension. It appears that meanings associated with blue are not consistent in all contexts. Yet, according to the overall mean rating found in the regression (8.293 on a 21-point scale), models were rated as slightly passive.

Model in general appears to influence the ratings, but individual models do not account for the ratings independent of Hue. The overall results for Activity strongly suggest the possibility of an interaction between color context and content for Activity. According to the literature, interactions of this sort should occur only for the Evaluation dimension. Given that the mean rating was slightly on the passive side, and that blue does not appear to contribute to this passivity, it may be that meanings for color context actually move in the direction of meanings for content, when live models are used.

For Potency (Table 12), only Model 3 entered into the regression equation. Model 3 accounted for approximately 12% of the variance ($F=19.75$, $B=.346$, $p < .05$). In terms of the experimental stimuli (position of model, length of exposure, etc.), the models do not substantially differ from one another. The most feasible explanation for the result of this regression is body type. Model 3 was a mesomorph, which is the body type typically associated with a normal stature, and most equated with the traditional conception of a model.

Models 1 and 2 were endomorphs (heavyset), and in interviews conducted after the experiment it became clear that subjects were expecting very traditional concepts of models. (In fact, most subjects said they equated "model" with "female.") Subjects may well have had definite meaning structures associated with the term "model," and rated the models according to those expectations.

For Evaluation (Table 13), only Group 3 entered into the regression equation. Group 3 accounted for approximately 3% of the variance ($F=4.36$, $B=-.171$, $p < .05$). It appears that the absence of Group 3 influenced the ratings. Table 14 summarizes the results of a regression conducted for the influence of specific models on Evaluation. Only Models 2 and 3 entered into the

regression equation. Model 2 accounted for approximately 10% of the variance ($F=8.11$, $B=.182$, $p<.05$), and Model 3 accounted for approximately 8% of the variance ($F=11.94$, $B=-.186$, $p<.05$).

Insert Tables 11, 12, 13, and 14 about here

It appears that the presence of Model 2 and the absence of Model 3 partially account for the ratings of models on Evaluation. In the course of conducting the experiment, Group 3 saw Model 3 first, then Model 2, and then Model 1. As mentioned, the stimuli were relatively novel in terms of the subjects' expectations associated with "model." In all three groups, subjects were initially amused by the presentation, exhibiting laughter when the first model was shown. This initial reaction to the stimuli may have subsided through the course of the experiment, and this reaction may be reflected in the ratings for Evaluation.

Discussion

The expectation that models would be rated similarly to ratings previously found in research literature for hues and saturations was not confirmed in this study. Models themselves were found to have the most influence

on the ratings. In previous studies inanimate objects were found to be rated the same as hues and saturations. Color context influenced content; content did not influence or override context. In this study, particularly with regard to Activity, content actually appears to influence the meanings associated with context.

However, the models did not substantially influence the ratings. Models accounted for a relatively small percentage of the variance. The major factor appears to be the subjects' perceptions of, and expectations associated with, the term "model."

In post-experimental interviews, subjects said they expected the models to be women. The subjects said that what were presented to them as "models" did not match what they expected to see. In explaining to subjects that they were rating models, a standard may have been provided subjects by which they could evaluate the models. That is, subjects may have rated models on the basis of how the models compared to subjects' expectations of how models should, in fact, appear.

Research in schema theory suggests people have certain "scripts" which set up expectations about what is likely to be encountered in a situation, and thus structure comprehension. More importantly, scripts pertain to

concepts, rather than just the relationships among words (Glass, Holyoak, & Santa, 1979; Wingfield & Byrnes, 1981). Thus, in this study, "model" was used as a concept, and with it were attached a number of interrelated meanings.

Berger and Luckmann (1967) elaborate on the source of meanings for social roles, and the implications for deviating from those expectations:

> Every institution has a body of transmitted recipe knowledge, that is, knowledge that supplies the institutionally appropriate rules of conduct. Such knowledge constitutes the motivating dynamics of institutionalized conduct. It defines the institutionalized areas of conduct and designates all situations falling within them. It defines and constructs the roles to be played in the context of the institutions in question. Ipso facto, it controls and predicts all such conduct. Since this knowledge is socially objectivated <u>as</u> knowledge, that is, as a body of generally valid truths about reality, any radical deviance from the institutional order appears as a departure from reality. (pp. 65-66)

In this study, the norms surrounding appropriate presentations of, and behaviors of, models were violated. Subjects dealt with novel information, and the basis on which to make sense of that information was to rely on social conventions/scripts pertaining to "models." Subjects judged models, not on the actual appearance of models but on the stereotype of models.

Such findings can be seen in research on gender and language. A number of studies (e.g., Der-Karabetian &

Smith, 1977; Liska, Mechling, & Stathas, 1981; Mulac & Lundell, 1980; Silvern, 1977) in this area found that while actual behaviors of males and females did not differ, the perceptions of those behaviors reflected perceived stereotypes of males and females. Males were thus rated differently from females, on the basis of expectations of performance.

In the studies conducted on color context and its influence on inanimate content, the color context may have provided the meaning for content which was otherwise devoid of meaning. The results of this study suggest the influence of color context is not necessarily generalizable to all forms of content. Indeed, Metallinos (1985) notes that color preferences, associations, and attributes change according to age, locality, education, sex, nationality, and a number of idiosyncratic features. Findings from color studies thus tend to be inconsistent, highly specialized, and relatively ungeneralizable.

It may be, then, that even content is not the sole determinant of ratings, any more than are hue and saturation. The issue is a matter of determining the nature of the content, that is, determining what factors peculiar to content will and will not override the

influences of both content and expectations associated with content.

This line of inquiry offers some useful direction for resolving issues related to the treatment of people as objects in visual presentations. For example, in this study, had a role not been assigned to the people used in the stimuli, subjects may have rated the models quite differently. Research could be conducted on various levels of abstractions of people. For example, the stimuli could be changed to mere line drawings of people, with various physical (e.g., movement) and social (e.g., different types of roles) details added as the research progresses.

The nature of the presentation should also be considered. In this study, the use of a "live" model in an apparently "lifeless" presentation may have generated a degree of incongruity for the subjects. Indeed, this may well explain the results found for Activity. What may have happened is that the concept of "model" may have been along the lines of "active," and when blue ("passive") was present the meaning network was incongruous. An interaction between hue and model may well have occured.

However, in previous studies, such interactions were

found for the Evaluation dimension. The differences between those studies which used inanimate objects, and this study which used peope in a live context, point to the fact that a totally different phenomenon was examined in this study. That difference suggests that a different line of exploratory research is needed when understanding the relationship between color context and people.

Future studies should employ an experimental design which allows statistical analysis of interaction effects. Although in this study hue and saturation were treated as independent, it may be useful to treat them as interrelated. (Hue cannot exist without saturation.) Because saturation and lightness have approximately the same form physically and psychologically, they could be treated as the same phenomenon (Wright & Rainwater, 1962).

Variations in hue may also prove useful. Spectral mid-range colors, such as yellow and green, would offer a refinement of the degree to which hue might influence ratings. Several studies (e.g., Jacobs & Suess, 1975; Wright & Gardner, 1960) examined the use of yellow and green, as well as blue and red. The findings are mixed, with some meanings for yellow being the same for red, and some meanings differing. Blue and green exhibit similar

results. Red and blue are simply polar extremes of the spectrum; culturally, people may hold different meanings for each of the four hues.

Research in this area offers useful information for both the media and those interested in the nature and understanding of people in general. That people can be perceived as mere objects, or as roles, and under what conditions this would hold, has implications for those interested in the ethical responsibilities of the visual media (e.g., for those interested in sexist advertising and the treatment of women as objects). Research could be expanded into how the visual treatment of people affects our meaning networks of people in general.

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Appendix I

Model No. _____

INSTRUCTIONS: Evaluate the model as you are watching him. For each pair of words listed below place an "X" or a check mark in the blank which comes closest to describing your opinion of the model you are evaluating. When you finish turn to the next page so you can evaluate the next model.

1. Unpleasant __ : __ : __ : __ : __ : __ : __ Pleasant
2. Calm __ : __ : __ : __ : __ : __ : __ Exciting
3. Fair __ : __ : __ : __ : __ : __ : __ Unfair
4. Shallow __ : __ : __ : __ : __ : __ : __ Deep
5. Bad __ : __ : __ : __ : __ : __ : __ Good
6. Powerful __ : __ : __ : __ : __ : __ : __ Powerless
7. Active __ : __ : __ : __ : __ : __ : __ Passive
8. Quiet __ : __ : __ : __ : __ : __ : __ Lively
9. Strong __ : __ : __ : __ : __ : __ : __ Weak

Appendix II

Tables

Table 1

Summary of Meanings Found for Red and Blue

Dimension	Red	Blue
Activity	Exciting	Calm
	Lively	Quiet
	Fast	Slow
	Hot	Cold
	Loud	Soft
	Restless	Quiet
Potency	Strong	Weak
	Deep	Shallow
	Heavy	Light
	Large	Small
Evaluation	Bad	Good
	Happy	Sad
	Unfair	Fair
	Dangerous	Safe
	Tense	Relaxed

Table 2

Semantic Scales and Corresponding Dimensions

Dimension	Scales	(Scale Name)
Activity	Calm/Exciting	(Exciting)
	Passive/Active	(Active)
	Quiet/Lively	(Loud)
Potency	Shallow/Deep	(Depth)
	Powerless/Powerful	(Power)
	Weak/Strong	(Strength)
Evaluation	Unpleasant/Pleasant	(Pleasant)
	Unfair/Fair	(Fairness)
	Bad/Good	(Good)

Table 3
Factor Analysis of Semantic Differential Scales

Ind. Variable	Scale	Loading(r)	Weight*
Activity	Exciting	.79	1.66
	Active	.69	.91
	Loud	.72	1.08
Potency	Depth	.76	1.37
	Power	.75	1.29
	Strength	.86	2.84
Evaluation	Pleasant	.81	1.91
	Fairness	.74	1.21
	Good	.78	1.55

*Weight=$r^2/1-r^2$

Table 4
Experimental Design

		SATURATION:		
		High	Medium	Low
HUE:	Blue	I_1	II_2	III_3
	Red	III_2	I_3	II_1
	Monochrome	II_3	III_1	I_2

I=Group 1
II=Group 2
III=Group 3

1=Model 1
2=Model 2
3=Model 3

Table 5
MANOVA for Activity

Source	SS	df	MS	F
Hue	151.484	2	75.742	6.988*
Saturation	4.459	2	2.230	0.206
Model	94.113	2	47.057	4.338*
Group	33.809	2	16.904	1.558
Error	1486.245	137	10.849	

*p < .05

Table 6
MANOVA for Potency

Source	SS	df	MS	F
Hue	30.878	2	15.439	1.408
Saturation	24.760	2	12.380	1.129
Model	327.936	2	163.968	14.944*
Group	51.106	2	25.553	2.330
Error	1502.197	137	10.965	

*p < .05

Table 7
MANOVA for Evaluation

Source	SS	df	MS	F
Hue	21.955	2	10.978	1.097
Saturation	30.581	2	15.290	1.528
Model	118.058	2	59.029	5.897*
Group	45.366	2	22.683	2.266
Error	1371.409	2	10.010	

*$p < .05$

Table 8
Regression for Hue, Saturation, Model, and Group (ACTIVITY)

Source	B	R^2	F
Hue	.3286	.0830	13.122*
Model	.2067	.1241	10.197*

*$p < .05$

Table 9
Regression for Hue, Saturation, Model, and Group (POTENCY)

Source	B	R^2	F
Model	.2391	.0572	8.794*

*$p < .05$

Table 10

Regression for Hue, Saturation, Model, and Group (EVALUATION)

Source	B	R^2	F
Group	-.1635	.0267	3.982*

*p < .05

Table 11

Regression for Red, Blue, and Monotone (ACTIVITY)

Source	B	R^2	F
Blue	-.2740	.0751	11.767*

*p < .05

Table 12

Regression for Model 1, Model 2, and Model 3 (POTENCY)

Source	B	R^2	F
Model 3	.3463	.1199	19.754*

*p < .05

Table 13

Regression for Group 1, Group 2, and Group 3 (EVALUATION)

Source	B	R^2	F
Group 3	-.1709	.0292	4.363*

*p < .05

Table 14

Regression for Model 1, Model 2, and Model 3 (EVALUATION)

Source	B	R^2	F
Model 2	.1820	.1012	8.107*
Model 3	-.1862	.0761	11.943*

*p < .05